(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 787 119 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
08.10.2014 Bulletin 2014/41

(51) Int Cl.:
D06H 7/06 *(2006.01)*

(21) Application number: **14161889.2**

(22) Date of filing: **27.03.2014**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **05.04.2013 IT MI20130510**

(71) Applicant: **Monti-Mac S.R.L.**
22075 Lurate Caccivio (CO) (IT)

(72) Inventor: **Monti, Renato**
22070 Appiano Gentile (CO) (IT)

(74) Representative: **Ottazzo, Marco Francesco Agostino et al**
Barzanò & Zanardo Milano S.p.A.
Via Borgonuovo, 10
20121 Milano (IT)

(54) Machine for automatically trimming fabrics

(57) A machine for trimming a fabric is described of the type provided with at least one edge or selvage having a ragged outline and provided with a plurality of protruding fringes. The machine comprises a supporting structure that is configured so as to support and make the fabric advance in continuous towards one or more cutting devices each arranged at a single edge of the fabric. Each cutting device is provided with at least one cutting means, configured so as to carry out in continuous the cutting of the protruding fringes, and is mounted on at least one linear guide, operatively connected to the supporting structure, in order to move with a rectilinear movement along a direction that is substantially perpendicular to the advancing direction of the fabric. Each cutting device is provided with at least one optoelectronic device for acquiring information pertaining to the width of the protruding fringes and to their position with respect to a predefined reference system. The optoelectronic device is operatively connected to a computer that is capable of moving the cutting device along the respective linear guide in order for the respective cutting means to carry out the cutting of the protruding fringes following a predefined trimming line. The optoelectronic device is a camera operating with CCD or CMOS technology that is configured so as to detect and convert the width of the protruding fringes of the edge into digital information. The computer is provided with a screen on which it is possible, in each instant, to verify the correct positioning of the trimming line so that it is possible to, automatically or manually, carry out possible corrections of the trimming line through the repositioning of the respective cutting device along its linear guide.

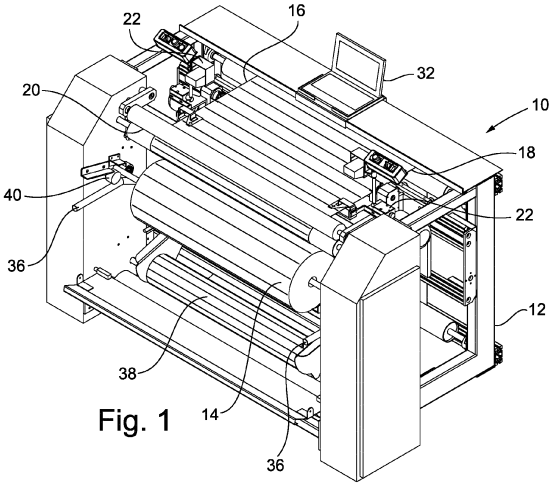


Fig. 1

EP 2 787 119 A1

Description

[0001] The present invention refers in general to a machine for automatically trimming fabrics and, more in particular, to a machine for automatically trimming rolls of fabrics on two sides.

[0002] As it is known, the longitudinal edges of the fabrics in pieces or in rolls are usually called selvages. The threads that form the selvages do not normally have a homogeneous interlacing, but are ragged and have a plurality of small protruding fringes that form a frayed edge with a width that can vary, typically starting from a minimum width of 4 mm.

[0003] When processing the fabrics on digital printing machines the presence of a similar frayed edge can lead to even serious drawbacks. Due to the electrostatic charges that are generated inside such printing machines, the fringes of the selvages can indeed lift up from the work plane. The movement of the printing mechanism can thus cause the fringes to fold back on the surface of the fabric, causing the formation of colour stains and negatively affecting the quality of the printing.

[0004] Machines for automatically trimming fabrics have thus been made which are provided with sensor means that are capable of identifying a correct cutting line for the fringes of the selvages, like for example those described in documents JP H06 128875 A, JP H09 119044 A and JP S59 59973 A. However, in such trimming machines according to the prior art it is not possible to verify, in each instant, the correct positioning of the cutting line, in order to be able to carry out possible corrections in an automatic or manual manner.

[0005] The purpose of the present invention is therefore that of making a machine for automatically trimming fabrics, in particular a machine for automatically trimming rolls of fabric on two sides, which is capable of solving the drawbacks mentioned above of the prior art in an extremely simple, cost-effective and particularly functional manner.

[0006] In detail, one purpose of the present invention is to make a machine for automatically trimming fabrics which is capable of eliminating excess fringes of the selvages without damaging the continuity of the fabric.

[0007] Another purpose of the present invention is that of making a machine for automatically trimming fabrics that is capable of using cutting devices of the known type, which are commonly applied to generic machines for processing the edges of fabrics, thus being particularly simple and cost-effective to manufacture.

[0008] These purposes according to the present invention are achieved by making a machine for automatically trimming fabrics, in particular a machine for automatically trimming rolls of fabric on two sides, as outlined in claim 1.

[0009] Further characteristics of the invention are highlighted in the dependent claims, which are an integrating part of the present description.

[0010] The characteristics and the advantages of a machine for automatically trimming fabrics according to the present invention shall become clearer from the following description, given as an example and not for limiting purposes, with reference to the attached schematic drawings, in which:

figure 1 is a perspective view of a preferred embodiment of the machine for automatically trimming fabrics according to the present invention;
figure 2 is a side view of a cutting device of the machine for automatically trimming of figure 1;
figure 3 is a front view of the cutting device of figure 2;
figure 4 is another side view of the cutting device of figure 2;
figure 5 is a perspective view of the cutting device of figure 2;
figure 6 is a view from above of the cutting device of figure 2; and
figure 7 shows two different configurations of the selvages of a generic fabric being processed on the machine for automatically trimming of figure 1.

With reference to the figures, a preferred embodiment of the machine for automatically trimming fabrics according to the present invention is shown, wholly indicated with reference numeral 10. The machine 10 comprises a supporting structure or frame 12 that is configured so as to rotatably support at least one roll 14 of fabric to unwind. The fabric is of the type provided with a pair of opposite longitudinal edges or selvages 16 and 18 each having a ragged outline and provided with a plurality of small protruding fringes to be removed.

[0011] On the frame 12 of the machine 10 one or more motorised calenders 20 are mounted, said calenders being configured so as to unwind the fabric from the respective roll 14 and to make such a fabric advance in continuous towards one or more cutting devices 22 supported by the frame 12 and each arranged at a single edge 16 or 18 of the fabric itself. Each cutting device 22 is thus capable of trimming the corresponding edge 16 or 18 of the fabric.

[0012] In detail, with reference in particular to figures from 2 to 6, each cutting device 22 is provided with at least one directional blower means 24, that is capable of aligning the protruding fringes of the corresponding edge 16 or 18 of the fabric in order to carry out the subsequent cutting operation in a correct manner. As shown for example in figure 5, the directional blower means 24 can comprise a releasable gripper mechanism on the corresponding edge 16 or 18 of the fabric for always maintaining such an edge 16 or 18 at a same predetermined height, so as to carry out the subsequent cutting operation in a correct manner.

[0013] Each cutting device 22 is thus provided with at least one cutting means 26 that is capable of cutting the protruding fringes of the corresponding edge 16 or 18 of the advancing fabric in continuous. The cutting means 26 can be of any type known at the state of the art.

[0014] Each cutting device 22 is mounted on at least one linear guide 28, which is operatively connected to the frame 12 of the machine 10, and it is mobile with a rectilinear movement along such a linear guide 28 in a direction that is substantially perpendicular to the advancing direction of the fabric. Consequently, such a cutting device 22 can be selectively moved towards and/or away from the corresponding edge 16 or 18 of the fabric in order for the relative cutting means 26 to be capable of cutting the protruding fringes of such an edge 16 or 18 in a correct manner.

[0015] Both the fabric being processed and the protruding fringes of the respective edges 16 and 18 do not in fact have a width that is always constant and homogeneous. Cutting such protruding fringes too much could thus cause damage to the side portions of the fabric. Vice versa, cutting such protruding fringes too little and/or incompletely could lead to drawbacks in the subsequent printing operations of the fabric, as indicated in the preamble of the present description.

[0016] According to the invention, each cutting device 22 is thus provided with at least one optoelectronic device 30 for acquiring sequences of images, like for example a camera operating with CCD or CMOS technology. The camera 30 is configured so as to detect and convert the width of the protruding fringes of the edge 16 or 18 of the fabric into digital information, as well as their position with respect to a predefined reference system.

[0017] The camera 30 is operatively connected to a computer 32 that is provided with suitable software that is capable of processing the information acquired by the camera 30 itself. Based upon the information coming from the camera 30 the computer 32 is thus capable of moving the cutting device 22 along its linear guide 28 in order for the respective cutting means 26 to cut the protruding fringes of the edge 16 or 18 of the fabric following a predefined trimming line 34, which is set by the computer 32 itself and is shown in figure 7.

[0018] The machine 10 can be provided with recovery means of the scraps, that is to say, the fringes cut by the cutting means 26 of each cutting device 22. For example, such recovery means of the scraps can be made up of one or more suction nozzles 36 that are integral with the frame 12 of the machine 10 and that are each positioned below every single cutting device 22, as shown in figure 1.

[0019] The machine 10 is thus provided with at least one second roll 38, also rotatably supported by the frame 12, on which the fabric is wound once the protruding fringes of the respective edges 16 and 18 have been cut. Similarly to the first roll 14 of fabric to be unwound, also the second roll 38 can be provided with one or more respective winding motorized calenders (not shown).

[0020] The operation of the machine 10 according to the present invention occurs in the following manner. The first operation consists of positioning a roll 14 of fabric to be unwound on the suitable supporting elements 40 that are provided on the frame 12 of the machine 10. The head portion of the fabric must thus be introduced in the motorised calender 20 so as to obtain the unwinding of the fabric itself from the respective roll 14.

[0021] In the case in which many rolls 14 of fabric, arranged in sequence, were to be trimmed, it could be possible to carry out the operation of introducing the head portion of the fabric into the motorised calender 20 a single time. The continuity of the trimming process can indeed be ensured by sewing the end portion of the fabric wound on the roll of which the trimming operation is ending with the head portion of the fabric wound on the following roll. The continuity of the fabric is an important condition for a rational operation of the machine 10 according to the invention.

[0022] Once the fabric has been inserted correctly into the machine 10 the cutting devices 22 are moved towards the respective opposite longitudinal edges 16 and 18 of the fabric itself, in such a way that the corresponding cutting means 26 are in the operative position. At this point it is possible to close the gripper mechanisms of the cutting devices 22 on the corresponding edges 16 and 18 of the fabric.

[0023] The trimming line 34 is initially set manually, operating on the control panel 42 of each cutting device 22 and verifying, on the screen of the computer 32, the correct overlapping of such a trimming line 34 on the protruding fringes of the corresponding longitudinal edge 16 or 18 of the fabric. If the machine 10 is provided with two distinct cutting devices 22, one for each longitudinal edge 16 and 18 of the fabric, the initial setting operation of the trimming line 34 must be carried out independently on each cutting device 22.

[0024] Once the aforementioned initial setting operations of the trimming line 34 have finished, the machine 10 is ready to start. The cutting means 26, just like the means 36 for recovering the scraps, can be activated by acting on the respective actuation selectors arranged on the control panel 42.

[0025] Through the cameras 30 it is possible to verify on the screen of the computer 32, in each instant, the correct positioning of the trimming line 34. Possible corrections of the trimming line 34, due for example to the need of following edges 16 and 18 of the fabric which are not perfectly rectilinear and/or with protruding fringes having a variable width, can be carried out manually by operating on the control panel 42 of each cutting device 22. The corrections of the trimming line 34 translate into a repositioning of the respective cutting device 22 along its linear guide 28.

[0026] Alternatively, the software of the computer 32 can be capable, through the information coming from the cameras 30, of automatically providing for the corrections of the trimming line 34 in real time. In this case it is the computer 32 itself that controls the movement of each cutting device 22 along its linear guide 28 so as to adapt it to the variations of the positioning and/or of the outline of the edges 16 and 18 of the fabric.

[0027] In an analogous manner, through the control panel 42 of each cutting device 22 (manual mode) and/or

through the computer 32 (automatic mode) it can be possible to control and possibly modify:

- the rotation speed of the motorised calenders 20 for unwinding and winding the fabric and, therefore, the advancing speed of the fabric itself; and
- the tension of the fabric between the unwinding and winding motorised calenders 20.

[0028] It is indeed necessary to adapt both the speed, and the tension of the fabric as a function of the type of fabric itself, as well as of the material with which such a fabric is manufactured, not only to ensure the effectiveness of the edge trimming operation, but also to avoid potential damage to the fabric itself.

[0029] It has thus been seen that the machine for automatically trimming fabrics according to the present invention achieves the previously highlighted purposes.

[0030] The machine for automatically trimming fabrics of the present invention thus conceived can in any case undergo numerous modifications and variants, all covered by the same inventive concept; moreover, all the details can be replaced by technically equivalent elements. In practice the materials used, as well as the shapes and sizes, can be any according to the technical requirements.

[0031] The scope of protection of the invention is therefore defined by the attached claims.

Claims

1. Machine (10) for trimming a fabric of the type provided with at least one edge or selvage (16, 18) having a ragged outline and provided with a plurality of protruding fringes, the machine (10) comprising:

- a supporting structure (12) configured so as to support and make the fabric advance in continuous towards one or more cutting devices (22); and
- one or more cutting devices (22) each arranged at a single edge (16, 18) of the fabric, wherein each cutting device (22) is provided with at least one cutting means (26), configured so as to carry out in continuous the cutting of the protruding fringes, and is mounted on at least one linear guide (28), operatively connected to the supporting structure (12), in order to move with a rectilinear movement along a direction substantially perpendicular to the advancing direction of the fabric,

each cutting device (22) being provided with at least one optoelectronic device (30) for acquiring information pertaining to the width of the protruding fringes and to their position with respect to a predefined reference system, the optoelectronic device (30) being operatively connected to a computer (32) capable of moving the cutting device (22) along the respective linear guide (28) in order for the respective cutting means (26) to carry out the cutting of the protruding fringes following a predefined trimming line (34), the machine (10) being **characterised in that** the optoelectronic device (30) is a camera operating with CCD or CMOS technology configured so as to detect and convert the width of the protruding fringes of said edge (16, 18) into digital information, said computer (32) being provided with a screen on which it is possible, in each instant, to verify the correct positioning of the trimming line (34) so that it is possible to carry out, manually or automatically, possible corrections of said trimming line (34) through the repositioning of the respective cutting device (22) along its linear guide (28).

2. Machine (10) according to claim 1, **characterised in that** the supporting structure (12) is provided with one or more supporting elements (40) configured so as to rotatably support at least one first roll (14) of fabric to unwind.

3. Machine (10) according to claim 2, **characterised in that** on the supporting structure (12) one or more motorised calenders (20) are mounted, said calenders (20) being configured so as to unwind the fabric from said first roll (14) and so as to make said fabric advance in continuous towards said one or more cutting devices (22).

4. Machine (10) according to claim 3, **characterised in that** it comprises at least one second roll (38), which is also rotatably supported by the supporting structure (12), whereon the winding of the fabric is carried out once the cutting of the protruding fringes of the respective edges (16, 18) has been carried out, said second roll (38) being provided with one or more respective winding motorized calenders.

5. Machine (10) according to any one of the claims from 1 to 4, **characterised in that** each cutting device (22) is provided with at least one directional blower means (24), configured so as to align the protruding fringes in order to carry out the subsequent cutting operation thereof in a correct manner.

6. Machine (10) according to claim 5, **characterised in that** the directional blower means (24) comprises a releasable gripper mechanism on the corresponding edge (16, 18) of the fabric for maintaining said edge (16, 18) always at a same predetermined height, so as to carry out the subsequent cutting operation thereof in a correct manner.

7. Machine (10) according to any one of the claims from

1 to 6, **characterised in that** it comprises recovery means of the fringes cut by the cutting means (26) of each cutting device (22).

8. Machine (10) according to claim 7, **characterised in that** the recovery means of the scraps are made of one or more suction nozzles (36) integral with the supporting structure (12) and each positioned below each single cutting device (22).

9. Machine (10) according to any one of the claims from 1 to 8, **characterised in that** each cutting device (22) is provided with a respective control panel (42) configured so as to set said trimming line (34) and carry out possible corrections of said trimming line (34).

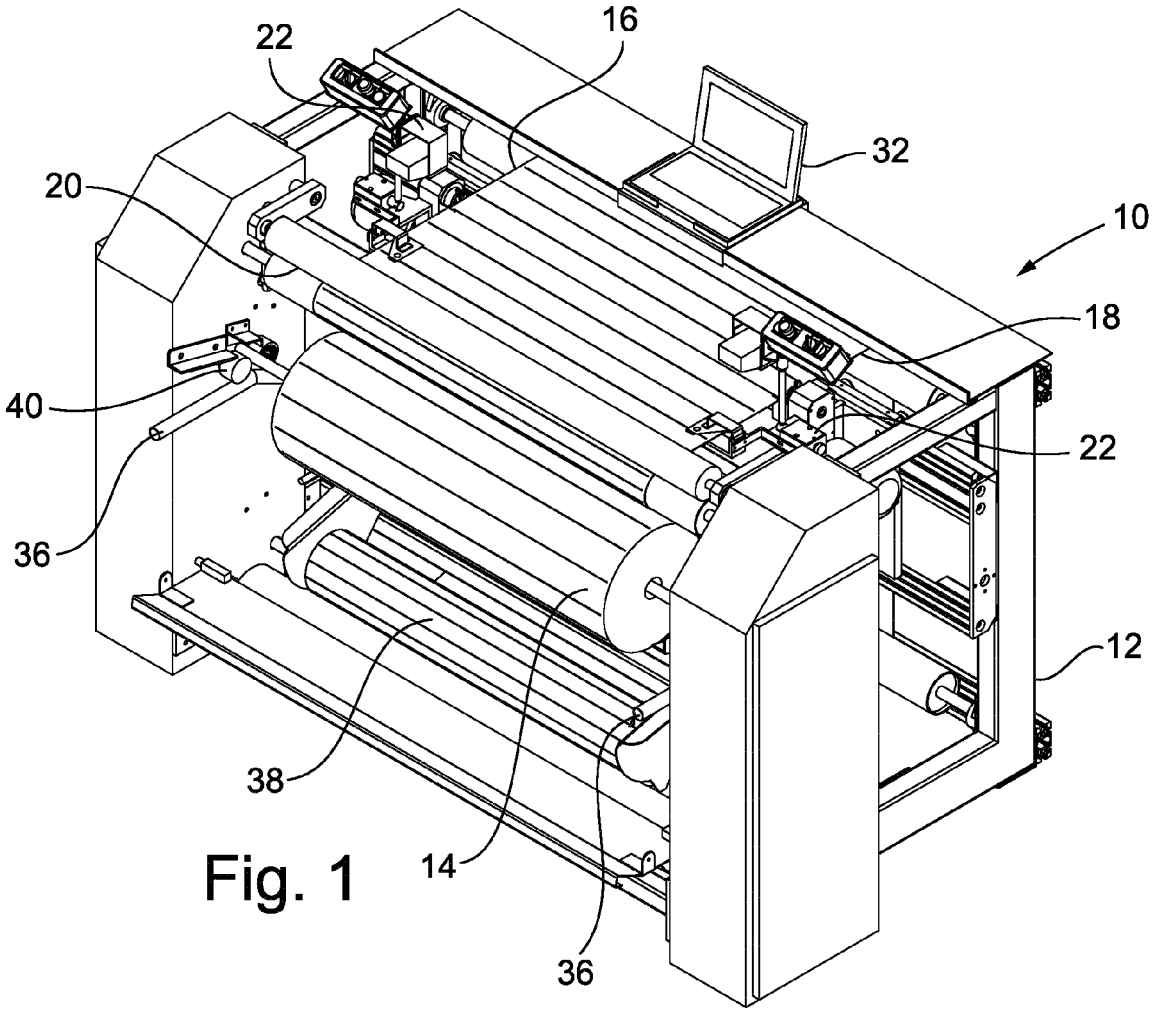


Fig. 1

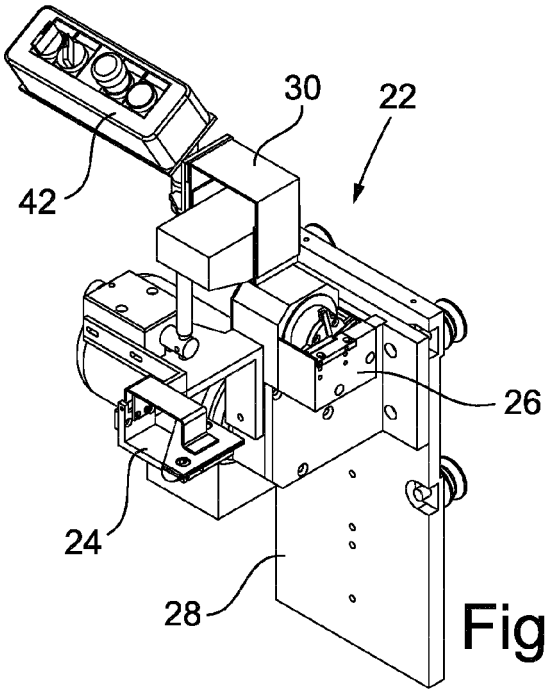


Fig. 5

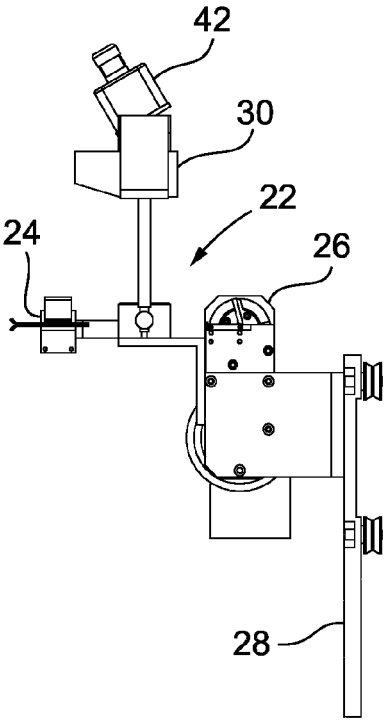


Fig. 2

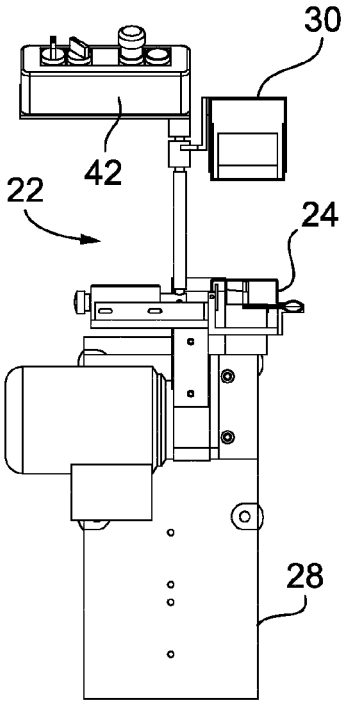


Fig. 3

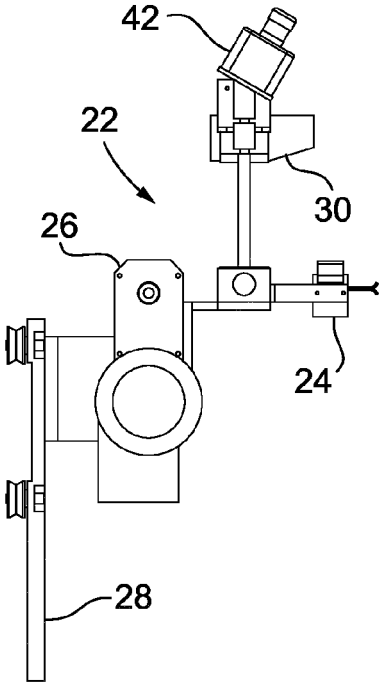


Fig. 4

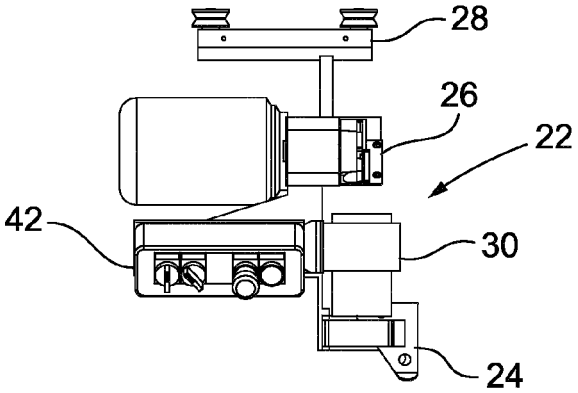


Fig. 6

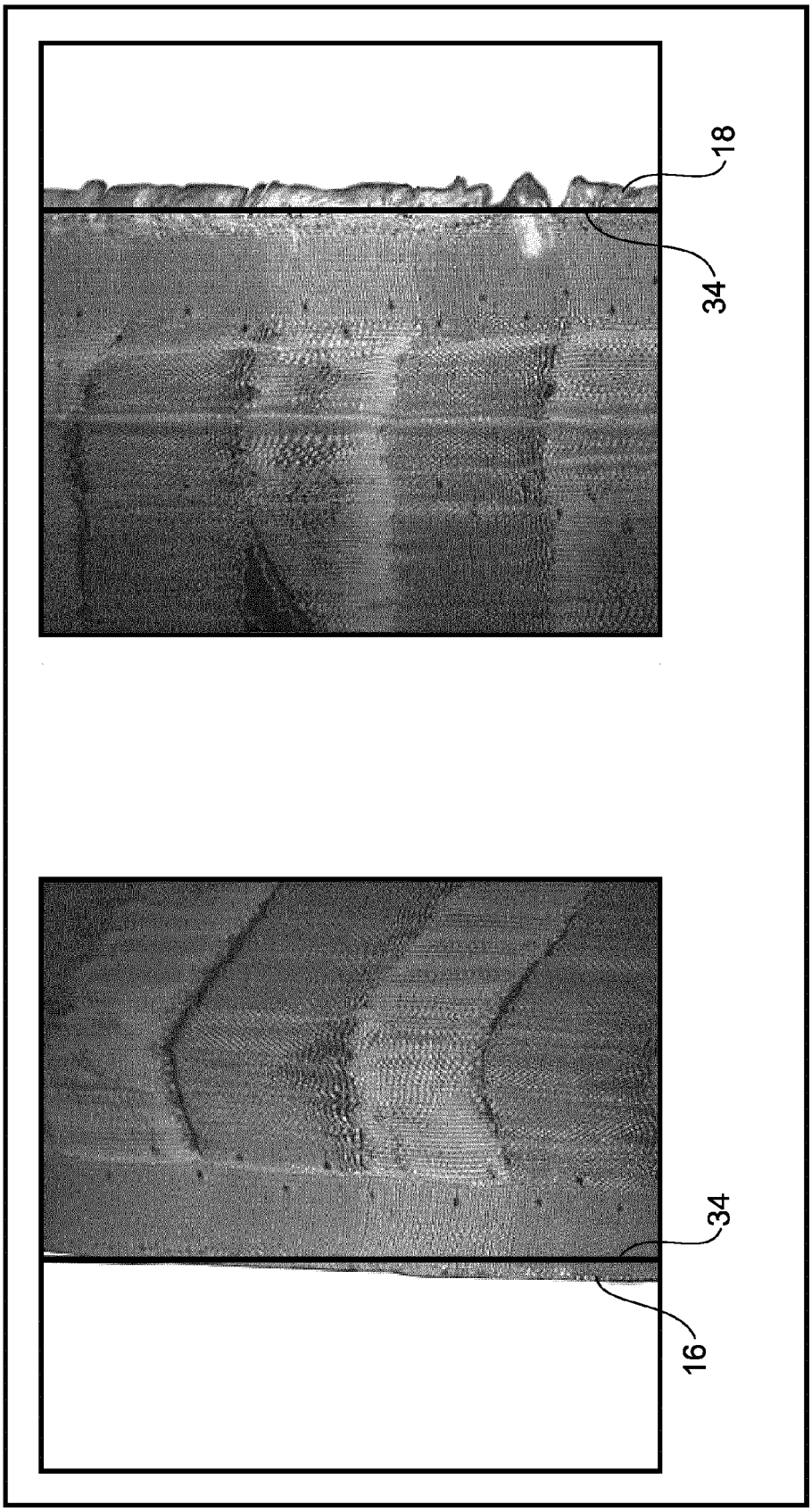


Fig. 7

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 14 16 1889

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	JP H06 128875 A (KANEBO LTD) 10 May 1994 (1994-05-10) * abstract; figures 1,2 * -----	1-9	INV. D06H7/06
A	JP H09 119044 A (JIETSUTO GIKEN KK) 6 May 1997 (1997-05-06) * abstract; figures 1-3 * -----	1-9	
A	JP S59 59973 A (NISSAN MOTOR) 5 April 1984 (1984-04-05) * abstract; figures 1-5 * -----	1-9	
			TECHNICAL FIELDS SEARCHED (IPC) D06H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	12 June 2014	Iamandi, Daniela

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons
.....
& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 14 16 1889

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

12-06-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP H06128875 A	10-05-1994	NONE	
JP H09119044 A	06-05-1997	NONE	
JP S5959973 A	05-04-1984	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP H06128875 A **[0004]**
- JP H09119044 A **[0004]**
- JP S5959973 A **[0004]**